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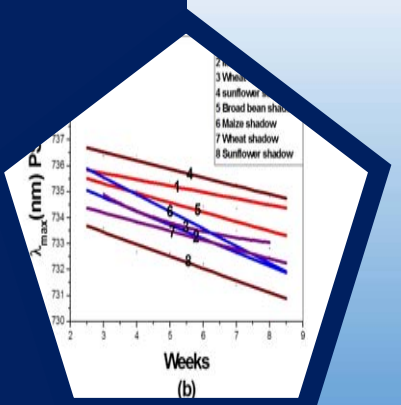

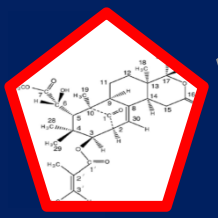

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Preparation and Characterization of Silver Nanoparticles

[1]Mohammed Hashim Albashir; [2]H.Farah Mohammed

[1.2]Nile Valley University – Sudan
m.hashim888@gmail.com

ABSTRACT

By using two Ag high purity rods immersed in distilled water as We get Ag nano particle simply, cheaply, and clean. Scanning electron microscopy (SEM) and (AFT) used to reveal the formation and the corresponding morphology of the silver nanoparticles UV-Visible spectrophotometer was used to detect the distinct absorption spectrum of silver nanoparticles. This method produced particle size of Colloidal silver solution (40-400) nm.

Keywords: NANO-SILVER, nanoparticles**.**

1. INTRODUCTION

Nanostructure materials have been the focus of intense research in recent decades due to their unique size-dependent physical and chemical properties (Sakoda, 2001). Since the particle size can be tailored readily from 1 nm to 100 nm in diameter with moderate to excellent control over size uniformity, the resulting novel properties of these materials have been exploited for various optical and electrical applications, including nano-electronics, photonic crystals 5, and sensors based on surface enhanced Raman scattering (Bjerneld et al., 1999) and near-field microscopy (Pohl and Courjon 1993). In addition, since a big proportion of biological problems

deals with dimensions of micron and sub-micron, nanostructured materials can easily fit into these areas, and consequently play important roles.

The importance of bactericidal nano materials study is because of the increase in new resistant strains of bacteria against antibiotics. Silver ions particles have been demonstrated to be useful and effective in bactericidal applications (Kim et al., 2007). Silver has been known to be a disinfectant for several centuries and hasbeen widely used in the treatment of clinical diseases, including newborn eye prophylaxis and topical burn wounds (Becker, 1999). Silver serves as a potent antibacterial agent, acting against an exceptionally broad spectrum of bacteria while exhibiting low toxicity to mammalian cells. Since silver therapy is of significant clinical benefit in the control of bacterial infections, various forms of new agents medical, biological and pharmaceutical preparations (Hans and Lowman, 2002).containing the silver ions, such as creams, solutions, electrodes, ligatures, biological skin and catheters, have been developed over the past decades. Therefore, not surprisingly, the antimicrobial properties of the silver ions have been extensively investigated (Zhao, Stevens1998), and many of the findings are well accepted universally.

The bactericidal action of silver ions and nano colloidal silver particles with size (20–140 nm) dispersed in different medium is well known (Eiechiguerra et al., 2005). Multifunctional materials, containing silver nano colloidal particles in reactive or non-reactive player networks, are in top of research for applications as biocides products, biomaterials, drugs supports,

etc (Lok et al., 2007). Break through silver nano technology that can render existing medical devices impervious to infection-causing bacteria. Unlike and other infection control technology available today (Sondi et al, 2004). Ag solution containing Ag ions have been used as antimicrobial agents in various fields because of their growth, Inhibitory capacity against micro organisms. In contrast, silver nano particle (SNP) allowed growth of the contact surface of Ag with micro organisms and Ag ions are released gradually. Although the NPs kill a great number of micro organisms, like virus, fungus and bacterium, however it is known as a non-toxic and does not cause skin irritation (Stephen, 2008).

2. MATERIALS AND METHODS

We used Dc power supply (12 V) and two Ag high purity rods (99.99%) were used as electrodes immersed in (250 ml) distilled water (PH7) (28 C^0) as shown in Fig-1. We prepared samples in different applied voltage (6 - 12 V) for hr. and samples in same voltage with a different time (30 min - 1 hr).

Figure 1: The electrochemical method

2.1 Characterization of Ag nano colloidal

The Ag colloid solutions were examined optically using UV-Visible spectrophotometer, and by using ultrasonic spray paralysis technique. Silver solutions were sprayed on glass substrates for size distribution determination by AFM. The colloidal silver is then collected for inspection and analysis by the SEM technique.

3. RESULTS AND DISCUSSION

3.1 Characterization Of Ag nano colloidal (CS) by UV

The Characterization Of Ag nano colloidal (CS) by using UV-Visible spectrophotometer shows as Figure -2 typical UV-visible absorption spectra

for the silver colloid suspension. The figure shows maximum absorbance in some band of spectra. We see dominate plasmonic resonance absorption peak at (400 nm).

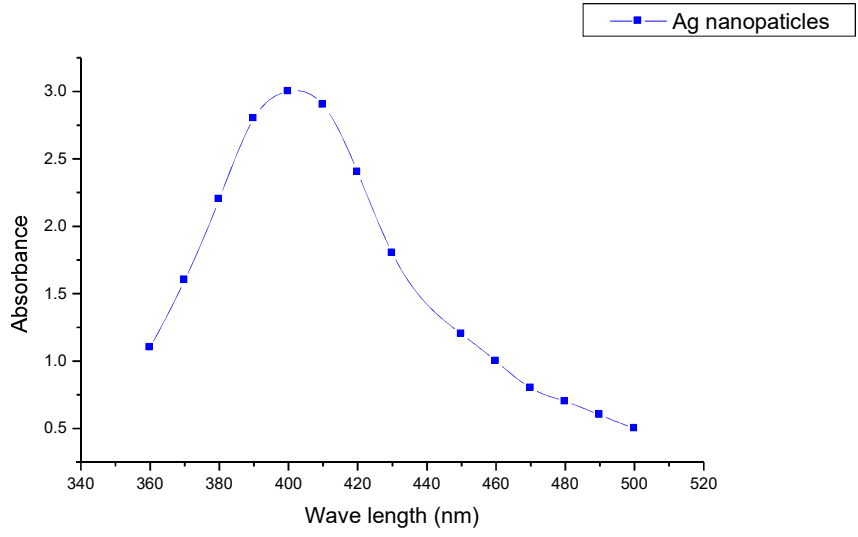

Figure 2: The UV-VIS absorption spectra of Ag nano colloidal.

3.2 Characterization Of Ag nano colloidal (CS) by AFT :

Figure -3 shows the AFM image of spherical Ag particles prepared by electrochemical technique with size distribution (40-400) nm.

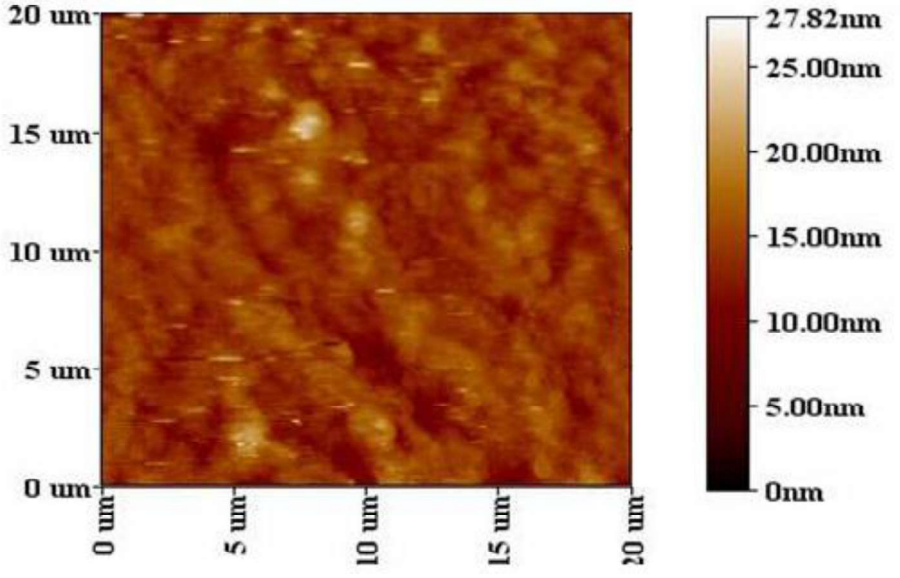

Figure 3: AFM image of Ag particle

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3.3 Characterization Of Ag nano colloidal (CS) by SEM

Scanning Electron Microscope was used to demonstrate the silver nanoparticles size distribution. Several drops of silver colloid were deposited on a conductive silicon wafer and then the sample was gently dried on a heating plate. The secondary electron SEM image was taken show fig-4 .The silver nanoparticles in water are stable for several months at room temperature without changing their properties.

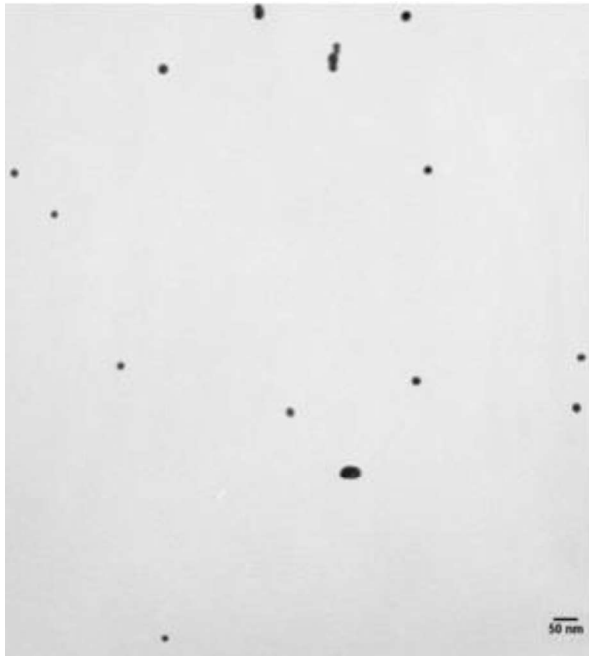

Figure 4: The SEM image of the silver nanoparticles

4. CONCLUSIONS

1- By using electrochemical method We get simply, cheaply, clean and faster than other methods.

2- This method produced particle size of Colloidal silver solution (40-400) nm.

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